Forward & Reverse Sweep & Signal Analysis

- *Continuously Referenced, Non-Interfering Sweep Frequency Response Measurement*
- *5 MHz to 1 GHz Frequency Range*
- *Easy to Read Graphic Signal Level Measurement; High Resolution LCD (320 x 240 dot matrix)*
- *Durable, Water Resistant Receiver can be Used in Rain*
- *Excellent Level Accuracy over a Wide Temperature Range*
- *Broad Scope of Measurement Capabilities*
- *Spectrum Analyzer Display*
- *Automated 24 Hour FCC Proof Measurements*
- *Digital QAM Carrier Average Power Measurement Option*

Reverse Sweep Option (3SRV)

- *Reverse Sweep Transmitter Built Into Hand-Held Sweep Receiver*
- *Enables Simple Bi-Directional Alignment by One Man, Using One Hand-Held Instrument*
- *Reverse Noise Feature Helps Troubleshoot Reverse Path Noise and Ingross Problems*

Hand-Held Transmitter Option (3SRT)

- *Full Transmit, Receive and Reverse Sweep Capability*
- *Useful in Sweep-From-Node Applications*
- *Used to Isolate Specific Portions of Plant for Testing*
- *Can be Used to Test Cable Insertion and Structural Return Loss in the Field*

The Stealth Sweep System is a comprehensive measurement tool designed for testing a wide range of critical parameters for proving system performance and conducting preventative maintenance. Users can test frequency response, signal levels, C/N, hum, depth of modulation, CSO/CTB and intermodulation distortion. These levels can be displayed in the form of a single channel with both video and audio levels shown graphically and numerically, in a tilt mode with up to nine channels displayed on a bar graph, or in a scan mode with all of the channels (including video and audio carriers) displayed. A spectrum display provides a means of checking distortion and ingress.

Tough, Weatherproof Hand-Held Tool

The 3SR Receiver (Stealth System Sweep Receiver) is very small and lightweight, but there's no shortcut on its measurement capability or its means of display.

The 3SR Receiver's high resolution display (320 X 240 Dot Matrix LCD) presents extensive measurement information simultaneously.

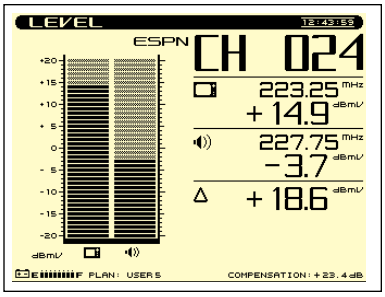
Along with its high accuracy and precision, the 3SR Receiver is tough and durable — made for use in field conditions. No waiting for the rain to stop before making measurements — the 3SR Receiver is a reliable partner, ready when you are.

Non-Interfering, Continuously Referenced Sweep

The 3SR Receiver references existing carriers when possible, and the 3ST Transmitter (Stealth System Sweep Transmitter) transmits a sweep to fill vacant spectrum areas. To avoid headend level drift or adjustment from affecting the sweep response, the 3ST Transmitter monitors the levels and transmits new reference information with every sweep. This means if the signal levels are changing in the headend, they won't effect the sweep response measurement. The 3ST Transmitter has all of the measurement capability of the 3SR Receiver, so the Headend Technician can closely monitor headend levels.

Comprehensive Testing

The 3SR Receiver is a full-featured signal analysis meter with a full spectrum display and analog representation of single channel measurement data. When tuned to a channel, comprehensive information is provided: tuned channel, video frequency and level, audio frequency and level, the difference between video and audio carrier levels and battery charge condition.



Measuring hum on a channel is as simple as pressing the "HUM" key. A CW carrier is no longer required, but the channel must not be scrambled. A carrier-to-noise measurement is just as simple, and again, there is no need to remove modulation from the video carrier.

Digital QAM Carrier Level Measurement

This feature permits accurate average power measurements of digitally modulated (16 and 64 QAM) carriers. The user simply specifies that the channel is a "digital carrier" type in the channel plan, and then indicates the bandwidth of the carrier to be measured. When a digital channel is selected, the instrument automatically switches to an RMS detection mode, makes and processes the measurement and displays the result on the LCD. The levels are displayed in similar fashion to "single" carrier types.

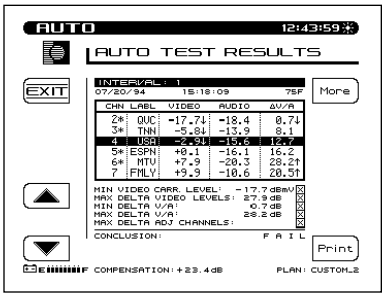
These screens may be printed directly, and the levels may be stored and printed or uploaded to a PC as part of an Autotest.

Extensive Auto Test Capability

Automated tests can be scheduled to perform either FCC compliance tests, or they can be initiated immediately in order to log performance at individual nodes, amplifiers, or other test points.

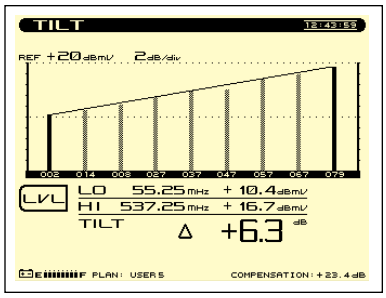
A wide range of tests can be performed automatically, including signal levels, C/N, hum and depth of modulation. Providing unprecedented flexibility, the Stealth enables the operator to designate which tests to perform on which channels. Because tests are non-intrusive, it's no problem to test all parameters on all channels.

After a test is performed, results can be displayed on the Stealth screen with a pass/fail indication on a variety of limits. Limits can be set for FCC or other government standards, or to system preferences. Data taken during any automated test, or sequence of automated tests, can be viewed with a pass/fail indication for each of the limits, and the operator can scroll through the stored data to look at specific measurement results. Automated test results can be printed directly to a printer or uploaded to a PC using StealthWare to store and manage the data or format reports.



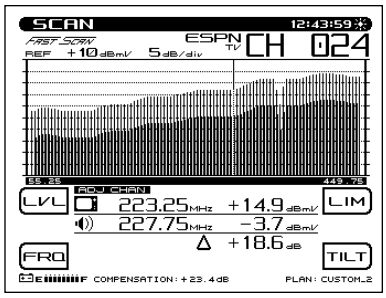
Informative Tilt Display

Before initiating a sweep at a specific amplifier test point, the technician typically balances the pilot levels. The "tilt" mode simplifies this step by displaying a bar graph with up to nine different user-selected video carrier levels represented. The levels of high and low pilots are shown, along with the difference between these carrier levels. From this mode, the operator can quickly switch to sweep by pressing the "sweep" key.



Channel Scan Mode

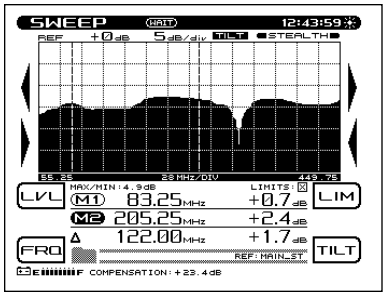
To get a quick look at absolute carrier levels, the "scan" mode is used. A bar graph showing all carrier levels is displayed. A marker selects which of the carrier's level is displayed on the bottom of the screen. Pressing the "level" key quickly changes the mode to show more detailed measurement information about the marked channel.



A "scan limits" feature enables a quick Go/No-Go test based on user-defined limits for minimum video carrier levels, maximum and minimum difference between video and audio carrier levels, maximum level difference between adjacent video carriers, and maximum level difference over the entire band. This allows the operator to quickly check to make sure the subscriber drop is within FCC specifications before initiating the 24 hour test.

Sweep Display

The Stealth sweep method is fast, accurate, and non-interfering. The levels are measured and stored at a reference point (headend, hub site, or first amplifier) and then compared on a sweep display at subsequent test points.

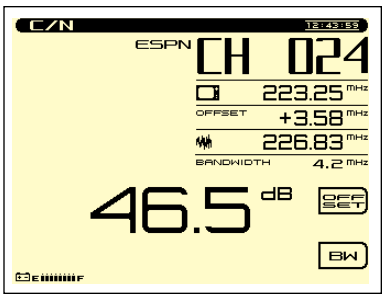


Dynamic nonvolatile memory enables the storage of at least 50 sweep traces for later viewing and at least 16 references may be stored, enabling the operator to test the response from any specific point in the system (bridger, fiber node, splitter, etc.).

A tilt compensation feature enables consistent measurement accuracy when specified tilt changes in the system, eliminating the need to store a new reference.

In-Service C/N Measurement

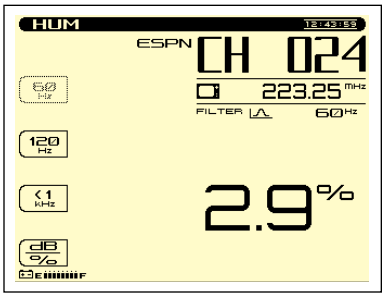
To receive a C/N measurement simply press the "C/N" key. The C/N ratio of the last tuned channel will be displayed, along with the noise measurement frequency and bandwidth. The C/N measurement bandwidth and the frequency offset for the noise measurement may be controlled from the measurement screen.



The Stealth System Sweep automatically searches for a quiet line in the vertical interval and acquires the noise measurement during that line. Preselection is not required for up to 78 channels at a +10 dBmV input level.

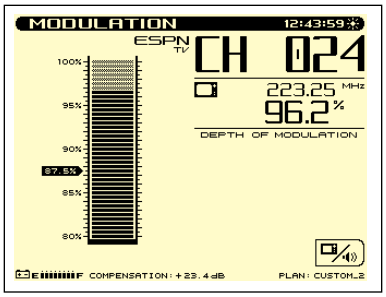
In-Service Hum Measurement

For a hum measurement simply press the "hum" key. The hum modulation of the last tuned channel will be displayed in either % or dB, as selected by the operator. Soft keys allow the selection of 60, 120 (50 or 100 for PAL systems) or <1,000 Hz filters for help in troubleshooting. Stealth's hum measurement tech-nique permits testing modulated carriers.



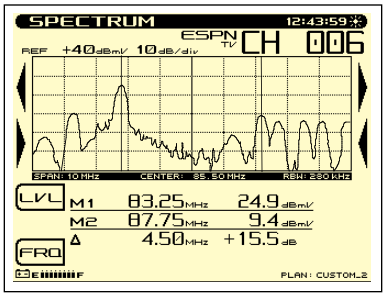
Video Depth of Modulation

The video depth of modulation screen provides percent modulation in both graphical and precise numeric format. This feature on the model 3ST makes it easy for the headend technician to do a quick check-up on modulation depth without having to set up special equipment.

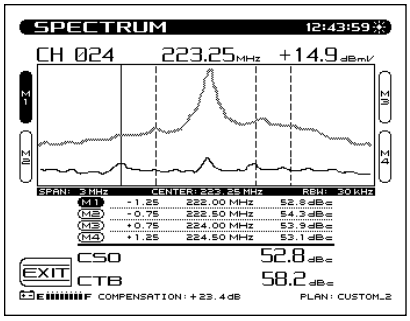


Spectrum Analyzer Display

Stealth's spectrum analyzer display provides a view of the system spectrum with variable spans from 3 MHz to 50 MHz and a dynamic range of better that 60 dB. The "max hold" function ensures that the highest signal over multiple sweeps is displayed. The spectrum analyzer display can even make FCC in-channel response measurements. Composite second order and composite third order intermodulation distortion tests are simplified with user prompted automated measurement processes. Preselection is required for accuracy in this measurement.



CSO and CTB Display



Data Analysis and Management With StealthWare

Any stored Stealth measurement information can be uploaded to a PC using StealthWare, a Windows™ based data management package. Stored sweep, scan, or spectrum screens can be viewed on the PC and analyzed with marker movement and readout information just as on the actual unit. StealthWare allows the operator to build channel plans and edit site locations which can then be downloaded to multiple Stealth instruments. Additionally, channel plans can be uploaded to the PC, modified in StealthWare, and then downloaded back to the Stealth instrument.

Reverse Sweep Option

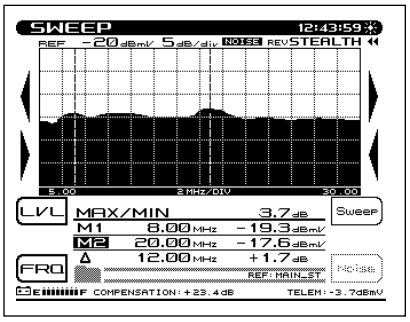
A Stealth Sweep System configured with a Reverse Sweep (3SRV) option allows simple, practical testing of the frequency response of the reverse path, regardless of the frequency pass-band (5 to 1,000 MHz range). No special pilot modules are required, as the 3ST transmitter and the 3SR receiver have frequency agile telemetry and can be configured to communicate on both the forward and reverse paths.

Forward (outbound) and reverse (inbound) path alignment can be done simultaneously by one person. The operator simply indicates which screen to be viewed, one being the response from the headend to the test point, the other being the response from the test point to the headend. There is a contention mechanism in place that permits multiple users to perform forward and reverse alignment.

Because the reverse sweep consists of only inserted sweep signals, and the bandwidth is typically relatively narrow (5 to 30 MHz), the sweep update is remarkably quick.

Reverse Noise

There are two key requirements to ensuring the proper operation of the reverse path. One is that the amplifiers be properly aligned to ensure that the digital signals are not clipped or compressed. The other is to maintain a proper carrier-to-noise and carrier-to-ingress ratio.



The Reverse Noise feature of the 3SRV option enables a quick swept noise test at the reverse sweep point frequencies. The operator simply presses the "Noise" soft key while sweeping reverse, and the display changes to a noise response indicating the noise level at the reverse sweep insertion frequencies. This provides for simple, comprehensive testing of both amplifier alignment and C/N in the headend based on the signal injected at a specific test point.

Portable Transmitter Option

The Model 3SR with a 3SRT option provides a flexible, portable solution for testing particular segments of a network. It is also a convenient problem solver for the contractor who may not have ready access to the headend, or who wants to be ready for anything unexpected.

This hand-held instrument not only receives sweep and performs the reverse sweep, but it can be configured to operate exactly like the 19" rack-mounted Model 3ST Transmitter. Applications for this include situations where it might be desirable to test a specific portion of the plant, while remaining unconnected to the headend. This might occur in new or rebuild cases in which physical or bureaucratic barriers impede connection to the headend. The 3SRT is also useful in construction situations where it is desirable to sweep cable prior to the installation of active components.

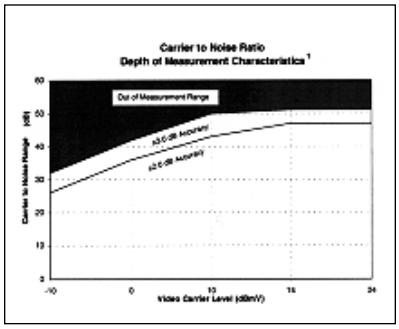
Specifications

Frequency
Range: 5 to 1,000 MHz
Accuracy: ±10 ppm at 25°C; ±10 ppm drift over temp.; ±3 ppm/year aging
Resolution Bandwidths: 30 and 280 kHz (30 kHz for CTB/CSO only)
Tuning Resolutions: 10 kHz
Sweep Resolution: 250 kHz maximum

Level Measurement
Range: -40 to +60 dBmV
Resolution: 0.1 dB
Accuracy: ±1.0 dB from -20 to +50°C [1, 2]
16/64 QAM Digital Carrier Power Measurement Option: ±1.8 dB @ 25° C

Hum Measurement
Carrier level must be ≥ -0 dBmV.
Non-scrambled channels only.
Range: 0 to 10%
Resolution: < 0.2%
Accuracy: ±0.7%

Carrier to Noise Measurement
Non-scrambled channels only. No preselection required for 78 channels at +10 dBmV input level.
Range: 52 dB maximum
Resolution: 0.5 dB



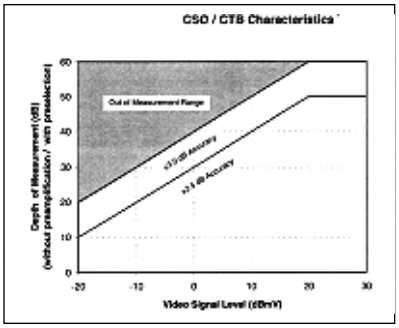
Frequency Response
Frequency Range: 5 to 1,000 MHz (Forward or Reverse)
Sweep Rate: 3SRT ≅ 1 second for 600 MHz sweep, no scrambled channels
Accuracy: ±0.5 dB, normalized (dependent on stability of referenced carriers)
Display Scaling and Range:
1, 2, 5, and 10 dB/division; 6 vertical divisions
Sweep Span: User definable from 5 to 1,000 MHz
Reference Storage: At least 16, including Forward, Reverse, or Sweepless
Sweep Trace Storage: At least 50, including Forward, Reverse, or Sweepless
Reverse Option Transmitter Output Level:
+10 to +40 dBmV, settable in 2 dB increments

Transmitter
Frequency Range: 5 to 1,000 MHz
Level Range: +10 to +40 dBmV; settable in 2 dB increments
Spectral Purity: Hars -30 dBc; Spurs -35 dBc

Telemetry
Frequency: User defined, 5 to 1,000 MHz
Modulation: FSK 100 kHz deviation
Spectrum Required: ≈1 MHz recommended

Spectrum Mode
Spans: 3, 5, 10, 20, and 50 MHz (0.5, 1, 2, and 5 MHz/div)
Sweep Rates: 2 seconds (50 & 5 MHz)
Display Scaling and Range: 0.5, 1, 2, 5, and 10 dB/division; 6 vertical divisions
Spurious Free Dynamic Range: 60 dB [1]

Intermodulation Distortion
Range: 60 dB maximum
Resolution: 1dB



Depth of Modulation
Assumes presence of white reference on any VITS line. Non-scrambled channels only.
Range: 80 to 100%
Resolution: < 0.5% at 85%

Serial Interface
RS232; Epson, IBM Printers

General
Log Linearity: ±0.5 dB [1]
Flatness: ±0.5 dB [3]
Dimensions:
3SR Receiver:
15.2 cm (W) x 25.4 cm (H) x 5.1 cm (D)
6" (W) x 10" (H) x 2" (D)
3ST Transmitter:
48.3 cm (W) x 13.3 cm (H) x 35.6 cm (D)
19" (W) x 5.25" (H) x 14" (D)
Weight:
3SR Receiver: 1.95 kg (4.3 lbs.)
3ST Transmitter: 6.8 kg (15 lbs.)
3SR w/3SRV or 3SRT option: 2.2 kg (4.9 lbs.)
Operating Temperature Range:
3SR Receiver: -20 to +50°C; 0 to 120°F
3ST Transmitter: 0 to +50°C; .32 to 120°F
3SR w/Reverse Sweep Option: -20 to +47°C; -4 to +117°F
3SRT: -20 to +45°C; -4 to 113°F

Powering
Model 3SR Battery Life:
2.5 hours continuous (absolute worst case), replaceable battery cartridge
Model 3SR w/3SRV or 3SRT Option:
1.75 hours continuous (absolute worst case)
Model 3SR Charge Time:
4 hours fast charge; 30 hour slow charge (with unit operating)
Model 3ST:
47 to 63 Hz ~ 100 VA; 100 to 265 VAC

Ordering Information
Model 3SR Receiver Includes a durable canvas carrying case, a battery charger/AC adapter, one spare battery, and two spare "F" type input connectors.
Model 3ST Transmitter Includes a line cord and a channel plan transfer cable.

Options
3SRV Option
Stealth Reverse Sweep Option for 3SR
3SRT Option
Portable, Hand-Held Sweep Transmitter Option for 3SR
3SR DIG
Digital Carrier Level Measurement Option
StealthWare
Windows™ Compatible Data Management Package for Stealth Products

Optional Accessories
CBC-1
Cigarette lighter adapter
SBC-1
Charger for 1 spare battery cartridge
SBC-6
Charger for up to 6 spare battery cartridges
P-Stealth
Stealth Portable Serial Thermal Fusion Printer Kit (Citizen PN60). Includes cables and adapters required for printing.

A wide variety of options and accessories make the Stealth Sweep System fit every application. Left to right: StealthWare Data Analysis Software (PC not included), Stealth Soft Carrying Cases, Sweep Transmitter, P-Stealth Portable Printer, Battery Chargers, Cigaretter Lighter Adapter, Chargers/Adapters, 3SR Sweep Receiver with 3SRT Option, 3SR Sweep Receiver with 3SRV Option, NS-6 Summing Network, 3SR Sweep Receiver, and Stealth Operating Manuals

1217-50-0151
Stealth Serial Printer Cable (for Kodak/Diconix printer, 25 pin male connector)
PP-75
Precision Preselector for Intermodulation Distortion Testing (55 to 440 MHz)
PP-55-110
Tunable Precision Preselector (55 to 110 MHz)
PP-110-220
Tunable Precision Preselector (110 to 220 MHz)
PP-220-440
Tunable Precision Preselector (220 to 440 MHz)
PP-440-880
Tunable Precision Preselector (440 to 880 MHz)
7201
Tunable Precision Preselector (31 to 62 MHz)
7202
Tunable Precision Preselector (62 to 125 MHz)
7203
Tunable Precision Preselector (125 to 250 MHz)
7204
Tunable Precision Preselector (250 to 500 MHz)
1219-00-1165
3SR Battery Cartridge
4010-00-0105
Charger/Adapter 120VAC to 18VDC
1019-00-0437
Charger/Adapter 220VAC to 18VDC
3010-12-0051
3SR Soft Carrying Case
(included with Model 3SR)
1217-50-0149
Channel Plan Transfer Cable
(included with Model 3ST)
1217-50-0159
Stealth Serial Printer Cable
(included with P-Stealth printer)

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Windows™ is a registered trademark of the Microsoft Corporation
[1] Typical Specifications
[2] Relative to 25°C
[3] @ 25 °C, @ 20 dBmV
Specifications are subject to change without notice
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